

US006724704B2

(12) United States Patent

Kuroda

(10) Patent No.:

US 6,724,704 B2

(45) Date of Patent:

Apr. 20, 2004

(54) INFORMATION RECORDING APPARATUS FOR WRITABLE RECORDING MEDIA

(75) Inventor: Kazuo Kuroda, Tokorozawa (JP)

(73) Assignee: Pioneer Electronic Corporation, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this

patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 10/230,078

(22) Filed: Aug. 29, 2002

(65) Prior Publication Data

US 2003/0002408 A1 Jan. 2, 2003

Related U.S. Application Data

(62) Division of application No. 09/227,532, filed on Jan. 8, 1999, now Pat. No. 6,522,608.

(30) Foreign Application Priority Data

Jan.	14, 1998 (JP)	10-6081
(51)	Int. Cl. ⁷	G11B 5/09
(52)	U.S. Cl	
(58)	Field of Search	
	369/47.31, 47.15	5, 53.31, 53.34, 53.24, 53.44,
		124.14, 124.08

(56) References Cited

U.S. PATENT DOCUMENTS

5,062,091	A	10/1991	Maeda et al.	
5,187,699	Α	2/1993	Raaymakers et al.	
5,463,607	Α	10/1995	Roth et al	369/47.54
5,815,472	Α	9/1998	Kuroda et al.	

6,252,838 B1 6/2001 Kuroda et al. 369/47.28

FOREIGN PATENT DOCUMENTS

EP	0 384 405 A	8/1990
EP	0 718 831 A	6/1996
EP	0 800 172 A	10/1997
EP	0 813 198 A	12/1997
EP	0 872 830 A1	10/1998
JP	1-220183	9/1989
JP	2-223066	9/1990
JP	3-260958	11/1991
JP	4-356730	12/1992
JP	5-182356	7/1993
JP	5-303833	11/1993
JP	9-270171	10/1997
JP	9-284720	10/1997
wo	WO 97/30439 A	8/1997

Primary Examiner—Paul W. Huber (74) Attorney, Agent, or Firm—Morgan, Lewis & Bockius LLP

(57) ABSTRACT

An information recording apparatus capable of smoothly reproducing in succession written data and data additionally written subsequent to the written data on a recording medium without disturbing a synchronization operation for read data during reproduction of information. The apparatus comprises a writing clock generating circuit for generating a writing clock signal for writing the new data into a recording medium while establishing synchronization with new data; a clock reproducing circuit for reading the written data from the recording medium, and reproducing a synchronization clock signal of the written data to generate a reproduced clock signal; and a phase adjusting circuit for synchronizing the phase of the writing clock signal with the phase of the reproduced clock signal.

9 Claims, 16 Drawing Sheets

